



OBSERVATIONS ON THE BIOLOGY AND DESCRIPTION OF THE LAST
INSTAR LARVA OF *PENEPODIUM LATRO* (KOHL, 1902)
(HYMENOPTERA, SPHECIDAE)¹

(With 2 figures)

SANDOR CHRISTIANO BUYS²

ABSTRACT: Observations on the biology of the solitary wasp *Penepodium latro* (Kohl, 1902) are presented, based on one female and her nest observed in a site from southeastern Brazil covered with Atlantic Tropical Rainforest. *Poecilodheris* sp. (Blattodea, Blaberidae) is reported as prey. The last instar larva of the wasp is described.

Key words: Wasp. Immature. Behaviour. Taxonomy.

RESUMO: Observações sobre a biologia e descrição da larva de último estágio de *Penepodium latro* (Kohl, 1902) (Hymenoptera, Sphecidae).

São apresentadas observações sobre a biologia da vespa solitária *Penepodium latro* (Kohl, 1902), com base em uma fêmea e seu ninho observados em um ponto do sudeste do Brasil coberto com floresta tropical atlântica. *Poecilodheris* sp. (Blattodea, Blaberidae) é registrado como presa. A larva de último estágio da vespa é descrita.

Palavras-chave: Vespa. Imaturo. Comportamento. Taxonomia.

INTRODUCTION

Penepodium Menke is a Neotropical genus of cockroach-hunting solitary wasps (BOHART & MENKE, 1976). This genus belongs to the subtribe Podiina, in which other three genera has been recognised: *Podium* Fabricius, *Dynatus* Lepeletier, and *Trigonopsis* Perty (OHL, 1996; AMARANTE, 2002). A few biological studies exist on species of *Penepodium* (WILLIAMS, 1928; RICHARDS, 1937; COOPER, 1980; GENISE, 1981; GARCIA & ADIS, 1993; BUYS 1998; GARÓFALO *et al.*, 2000). *Penepodium* is known in immature stage only by the last instar larva of *P. dubium* (Taschenberg, 1869) (BUYS, 2001) and very brief notes and illustrations on that of *P. luteipenne* (Fabricius, 1804) (WILLIAMS, 1928), both belonging to the *luteipenne*-group of species (BOHART & MENKE, 1976).

Penepodium latro (Kohl, 1902) is a very poorly known species belonging to the *gorianum*-group of species (BOHART & MENKE, 1976). The knowledge

on biology of this species is restricted to the short note by GARÓFALO *et al.* (2000). Herein, notes on biology of *P. latro* are presented and its last instar larva is described.

MATERIAL AND METHODS

The study was based on one female and her nest observed in the Municipality of Angra dos Reis, Vila do Abraão (Ilha Grande), State of Rio de Janeiro, southeastern Brazil (21 February 2001). The area was covered with Atlantic Tropical rainforest. The terminology used in the larval description follows EVANS & LIN (1956), with modifications. The number of punctures and setae on the genal areas respectively on the left side of the head and of the right side of the head were put in the description separated by a slash. The adult specimen was deposited in the entomological collection of the Museu de Zoologia, Universidade de São Paulo (MZSP), São Paulo, Brazil.

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² Universidade Federal do Rio de Janeiro, Departamento de Zoologia, Laboratório de Entomologia. 21944-970. Ilha do Fundão, Rio de Janeiro, RJ, Brasil.

Current address: Museu Nacional/UFRJ, Departamento de Entomologia. Quinta da Boa Vista, São Cristóvão, 20940-040, Rio de Janeiro, RJ, Brasil.
E-mail: sbuys@biologia.ufrj.br.

RESULTS

BIOLOGY

One female *P. latro* was seen engaged in closing her nest. The nest had been constructed inside a pre-existent hollow in a tree trunk, which was fallen in a trail near a small stream. This place was almost completely shaded by trees. The hollow was strongly curved and bore only one cell. The nest entrance was oval, with 0.9x1.4cm, and was 55cm high from the ground. Males were not seen near the nest. To close the nest, the female repeatedly collected with her mandibles lumps of compacted clay soil in a same point of the trail's ground, making a shallow concavity. She put the material in the nest entrance and wetted it regurgitating water. The nest was provisioned with one adult *Poecilodheris* sp. (Blattodea, Blaberidae). The egg of the wasp was white and sausage shaped and it was placed behind one forecoxa of the prey. The prey taken from the nest was able to actively walk, indicating that the paralysis caused by the venom of the wasp was temporary.

The prey was maintained in laboratory in a plastic pot, lined inside with moistened paper. After the egg hatching, the larva inserted the anterior portion of her body in the prey body, in the same point where the egg had been attached. The larva remained immobile feeding on the prey. After about two days, the prey died and the larva abandoned her body, even before its soft parts had been totally consumed. The larva had reached the last instar but she was not in the full grown. She was preserved in alcohol (80%) for further morphological studies.

The behavioural patterns observed in *P. latro* are similar to those of other related species. The habit of regurgitating water to model earth during the nest construction is known in other species of *Penepodium* (WILLIAMS, 1928; BUYS, 1998) and species of the related genus *Trigonopsis* (RICHARDS, 1937; EBERHARD, 1974). Several species of the subtribe Podiina lay their eggs behind one forecoxa of the prey (WILLIAMS, 1928; ARLÉ, 1933; KROMBEIN, 1967; 1970; EBERHARD, 1974; KIMSEY, 1978; COOPER, 1980; GARCIA & ADIS, 1993; BUYS, 1998). Other species of *Penepodium* paralyse only temporarily its prey (WILLIAMS, 1928; GARCIA & ADIS, 1993; BUYS, 1998).

BUYS (1998) found that the main cause of larval mortality of *P. dubium* in laboratorial conditions was the pre-mature death of the prey. It seems likely that the same have occurred with the specimen of *P. latro* herein studied.

GARÓFALO *et al.* (2000), using bamboo trap-nests, found

nests of *P. latro* with one or two cells. Moreover, they observed that *P. latro* uses resin in the closing of the nest, as had been previously reported in *Penepodium albavillosum* (Cameron, 1888) by COOPER (1980).

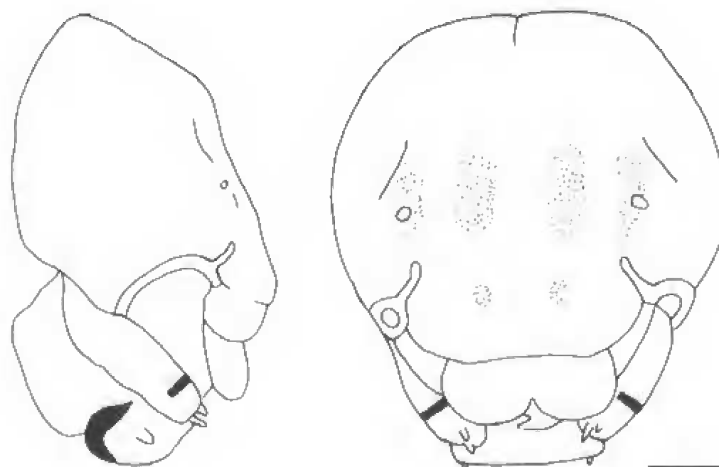
DESCRIPTION OF THE LAST INSTAR LARVA
(Figs.1-2)

Head capsule: Height 1mm; width 1.2mm. Antennal orbits circular, with about 50µm in diameter. Cephalic rugosity absent. Integument of the antennal, frontal, and clypeal concavities brown. Coronal area without punctures, with about 15 setae (9-14µm long). Frontal area with several punctures and two setae (about 10µm long). Clypeal area without punctures or setae. Genal areas with about 15/15 punctures and 4/7 setae (about 10µm long). There is no detected regular pattern of setal distribution on the head. Tentorial anterior arms, pleurostoma, and hypostoma brown.

Mouthparts: Labrum strongly bilobed, with 230µm long and 510µm wide; with scattered small basiconic sensillae, punctures (5µm in diameter) and setae (about 7-10µm long); margin with about 15 sensorial cones, those nearest to the midline crowded (apparently some sensorial cones are somewhat laterally fused). Epipharynx with spines, up to 15µm long, on lateral, median and marginal portions; sensorial area without pigmented portions, with three basiconic sensillae. Mandibles brown, darker in the apical portion and in the mandibular articulations; 550µm long; basal portion without punctures or setae. Maxillae with brown rings near to the apex; with about 15 setae (15µm long and about 2µm wide); maxillary palpi with 50µm long and 38µm wide; galeae with 68µm long and 50µm wide. Labium with lateral brown portions; 500µm wide; ventral portion papillose; labial palpi 40µm long and 38µm wide.

TAXONOMIC REMARKS

The last instar larva of *P. latro* is very similar to that of *P. dubium* described by BUYS (2001). However, the former species seems to be somewhat peculiar in bearing sensorial cones of the margin of the labrum crowded near median portion. Last instar larvae of five species of the genus *Podium* are known (EVANS & LIN, 1956; EVANS, 1964; BUYS *et al.*, 2004). Immature instars of other two genera of the subtribe Podiina, *Trigonopsis* and *Dynatus*, are unknown. Apparently, there are no features that sharply differentiate the last instar larva of *Penepodium* from those of *Podium*.



Figs.1-2- Last instar larva of *Penepodium latro*. (1) Lateral view of the head, (2) frontal view of the head. Scale bar = 250 μ m.

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REFERENCES

- AMARANTE, S.T.P., 2002. A synonymic catalog of the neotropical Crabronidae and Sphecidae (Hymenoptera: Apoidea). **Arquivos de Zoologia**, **37**(1):1-139.
- ARL E, R., 1933. Sobre a nidifica o, a biologia e os parasitos de *Sceliphron (Trigonopsis) abdominalis*, Petry. **Anais da Academia Brasileira de Ci ncias**, **5**:205-212.
- BOHART, R.M. & MENKE, A.S., 1976. **Sphecidae wasps of the world: a generic revision**. Berkeley: University of California Press. 665p.
- BUYS, S.C., 1998. **Hist ria natural e comportamento reprodutivo de *Penepodium dubium* (Tasch.) (Sphecidae, Hymenoptera)**, Rio de Janeiro. 85p. Disserta o (Mestrado em Ecologia), Programa de P s-Gradua o em Ecologia, Universidade Federal do Rio de Janeiro.
- BUYS, S.C., 2001. Last instar larva of *Penepodium dubium* (Hymenoptera: Sphecidae). **Revista de Biologia Tropical**, **49**(1):329-332.
- BUYS, S.C.; MORATO, E.F. & GAR FALO, C.A., 2004. Description of immature instars of three species of *Podium* Fabricius, 1804 (Hymenoptera: Sphecidae) from Brazil. **Revista Brasileira de Zoologia**, **21**(1):73-77.
- COOPER, M., 1980. Notes on the biology of *Dynatus nigrepes* (West.) and *Penepodium albavillosum* (Cam.) (Hym., Sphecidae). **Entomologists' Monthly Magazine**, **116**:87-89.
- EBERHARD, W.G., 1974. The natural history and behaviour of the wasp *Trygonopsis cameranii* Kohl (Sphecidae). **Transactions of the Royal Entomological Society of London**, **125**(3):295-328.
- EVANS, H.E. & LIN, C.S., 1956. Studies on the larvae of digger wasps (Hymenoptera, Sphecidae) Part I: Sphecinae. **Transactions of the American Entomological Society**, **81**:131-153, pls.1-8.
- EVANS, H.E., 1964. Further studies on the larvae of digger wasps (Hymenoptera: Sphecidae). **Transactions of the American Entomological Society**, **90**:235-299, pls.8-19.
- GARCIA, M.V.B. & ADIS, J., 1993. On the biology of *Penepodium goryanum* (Lepeletier) in wooden trap-nests (Hymenoptera, Sphecidae). **Proceedings of the Entomological Society of Washington**, **95**(4):547-553.
- GAR FALO, C.A.; CAMILO, E. & SERRANO, J.C., 2000. H bitos de nidifica o e ciclo de vida de *Penepodium latro* (Kohl), 1902 (Hymenoptera, Sphecidae). In: XXIII Congresso Brasileiro de Zoologia, **Programa e Resumos**, Cuiab : Universidade Federal de Mato Grosso. p.195.
- GENISE, J.F., 1981. Utilizaci n de excrementos de herbivoros en la nidificaci n de *Penepodium fumipenne* (Tasch.) (Hymenoptera, Sphecidae). **Ecosur**, **8**(15):51-52.

- KIMSEY, L.S., 1978. Nesting and male behavior in *Dynatus nigripes spinolae* (Lepeletier) (Hymenoptera, Sphecidae). **Pan-Pacific Entomologist**, **54**:65-68.
- KROMBEIN, K.V., 1967. **Trap-nest wasp and bees: life stories, nest and associates**. Washington: Smithsonian Institution Press, 570p.
- KROMBEIN, K.V., 1970. Behavioral and life-history notes on three Floridian solitary wasp (Hymenoptera: Sphecidae). **Smithsonian Contributions to Zoology**, **46**:1-26.
- OHL, M. 1996. The phylogenetic relationships within the Neotropical Podiinae with special reference to *Podium* Fabricius (Hymenoptera: Apoidea: "Sphecidae"). **Deutsche Entomologische Zeitschrift**, **43**(2):189-218.
- RICHARDS, O.W., 1937. Results of the Oxford University expedition to British Guiana, 1929. Hymenoptera, Sphecidae and Bembecidae. **Transactions of the Royal Entomological Society of London**, **86**:101-118.
- WILLIAMS, F.X., 1928. Studies in tropical wasps - their host and associates. **Bulletin of the Experimental Station of Hawaiian Sugar Planter's Association (Entomological Series)**, **19**:1-127.